

MEASURED AND EVALUATED FAST NEUTRON CROSS
SECTIONS OF ELEMENTAL NICKEL*

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ABSTRACT

Fast neutron total and scattering cross sections of elemental nickel are measured. Differential elastic scattering cross sections are determined from incident energies of 0.3 to 4.0 MeV. The cross sections for the inelastic neutron excitation of states at: 1.156 ± 0.015 , 1.324 ± 0.015 , 1.443 ± 0.015 , 2.136 ± 0.013 , 2.255 ± 0.030 , 2.449 ± 0.030 , 2.614 ± 0.020 and 2.791 ± 0.025 MeV are measured to incident neutron energies of 4.0 MeV. The total neutron cross sections are determined from 0.25 to 5.0 MeV. The experimental results are discussed in the context of optical and statistical models. It is shown that resonance width-fluctuation and correlation effects are significant. The present experimental and theoretical results, together with previously reported values, are used to construct a comprehensive evaluated elemental data file in the ENDF format. Some comparisons are made with previously reported evaluated files. In addition, some selected reactions which are widely used in dosimetry and other applications are presented as supplemental evaluated isotopic-data files. The numerical quantities are presented in tabular form.

* This work is supported by the U.S. Energy Research and Development Administration.